Sectionalizers

Type GH (Form 1) Maintenance Instructions

McGRAW-EDISON POWER SYSTEMS

S270-10-1

NOTICE

THESE INSTRUCTIONS COVER THE MAINTENANCE PROCEDURES FOR THE TYPE GH (FORM 1) SINGLE-PHASE, HYDRAULICALLY CONTROLLED SECTIONALIZER BELOW SERIAL NO. 35700.

FOR TYPE GH (FORM 2) SECTIONALIZERS, SERIAL NO. 35700 AND ABOVE, SEE S270-10-6.

CAUTION

DO NOT ENERGIZE THIS EQUIPMENT OUT OF OIL.

CONTENTS

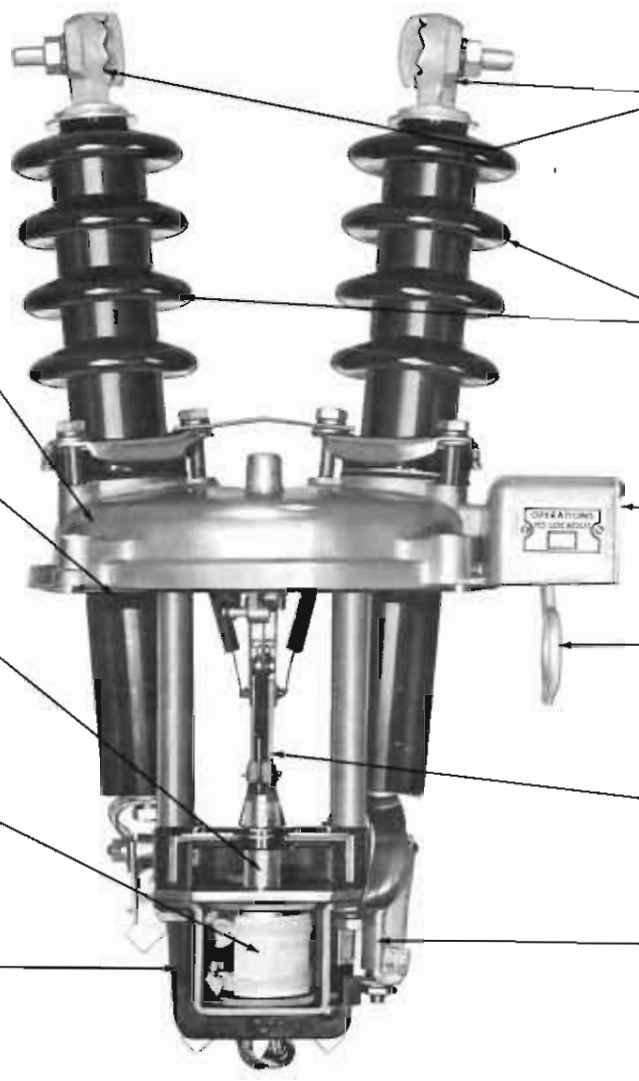
DESCRIPTION

A Type GH sectionalizer is an oil switch that senses operation of a backup protective device and locks open during an interval when the backup device is open. The sectionalizer merely counts operations of the backup device and opens after the pre-set number of operations has occurred.

The sectionalizer's counting mechanism is a simple hydraulic device consisting of a series coil, plunger, and trip piston. Each time fault current passes through the coil, the plunger is pulled down into the coil against spring pressure. When the backup device operates, the spring-loaded plunger returns to its normal position and, in so doing, pumps a measured quantity of oil under the trip piston. After the pre-set number of operations (one, two, or three), the trip piston advances enough to actuate the sectionalizer's trip mechanism.

Circuit opening is provided by double-break contacts driven by opening springs. These contacts can also be opened manually.

These instructions do not claim to cover all details or variations in the equipment, procedure, or process described, nor to provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your McGraw-Edison Power Systems sales engineer.



HEAD CASTING
aluminum, supports mechanism and bushings. Never needs painting.

"O" RING GASKET
resilient BUNA-N type. Can be reused over and over.

HYDRAULIC MECHANISM
provides dependable counting action. Automatic resetting enables device to "forget" temporary faults.

OPERATING COIL
can be easily exchanged to change sectionalizer rating.

CONTACT STRUCTURE
has double-break, snap-action contacts. Contacts are tipped with copper-tungsten to resist arc-erosion and provide long life.

UNIVERSAL CLAMP-TYPE TERMINALS
accept No. 8 through 2/0 copper or aluminum conductors.

BUSHINGS
15 kv, oil filled for very low radio-influence voltage.

SLEET HOOD
shields operating lever from icing.

OPERATING LEVER
trip free, is easily manipulated with hook-stick. Painted yellow for easy visibility of contact position.

LOCKOUT ADJUSTMENT BAR
permits simple setting of operations to lockout.

COIL BYPASS GAP
provides lightning surge protection for operating coil.

FIGURE 1
UNTANKED GH SECTIONALIZER.

GENERAL MAINTENANCE INFORMATION

A GH sectionalizer does not interrupt fault currents, so contacts experience little wear, and oil deteriorates slowly. Thus, Maintenance is usually directed toward keeping the device's insulation level at a reasonable level. This will generally be accomplished if the oil dielectric strength is at least 22 kv as measured across a standard .1-inch gap.

Oil deterioration is usually caused by accumulation of moisture condensed from air. Breathing, caused by changes in temperature, is responsible for introduction of new air. In humid locations having large changes in temperature, breathing may be an important factor. Because climatic conditions vary widely, experience will provide the best guide as to when maintenance should be performed.

PERIODIC INSPECTION AND MAINTENANCE

Periodic inspection and maintenance should include at least the following steps:

1. Bypass, trip and de-energize the sectionalizer. Remove from pole.
2. Inspect external components. Look for paint scratches, cracked bushings, or other mechanical damage.
3. Check external bypass gap settings, if furnished. Gaps should be 3¼ inches (plus or minus 1/8 inch) apart, and aligned symmetrically with respect to the insulated gap post.
4. Check oil level. Earlier sectionalizers were equipped with dipsticks. If not available, untank to check.
5. Untank mechanism. Remove four tank clamps and lift mechanism out of oil. Check to see the O-ring head gasket is in good condition.
6. Test oil. Dielectric strength should be at least 22 kv as measured across a standard .1-inch gap. Oil that is contaminated with sludge or that tests below this value should be discarded. Replace with new, dry, transformer oil. One and one-half gallons fill the tank to the correct level. (Top of the tank liner.)
7. Examine hydraulic mechanism. This device should need no attention other than washing in degreasing fluid to remove any oxidized oil film that may have accumulated. If it has been damaged, or if the coil is to be changed to another size, observe procedure outlined on page 4.
8. Check moving and stationary contacts. If badly eroded, replace. Otherwise smooth with crocus cloth.
9. Operate the control lever manually, and observe if all components operate properly. When tripping the sectionalizer in air, hold or cushion the moving contacts with one hand to eliminate impact and overstressing of contact box.
10. With lint-free cloth (or brush) wipe any carbon traces from insulating stringers, contact structure, hydraulic mechanism and tank. Flush with clean, dry, transformer oil. See that tank lip is flat.
11. Test electrical resistance of insulating stringers and contact link by use of an M-E Type TE tester, or similar device.
12. Before retanking, invert and prime the mechanism by introducing new insulating oil into the hydraulic mechanism by means of an ordinary squirt can. Then quickly place mechanism in tank far enough to cover the hydraulic mechanism with oil. With a slender tool, such as a small Allen wrench, push trip piston down to clear air from the hydraulic parts. Complete retanking operation.
13. Test operation. Momentarily connect a six-volt storage battery across sectionalizer terminals. Repeat this procedure at about one-second intervals and note if the sectionalizer locks open after the correct number of operations has occurred. If the unit does not lock out properly, wait three minutes and repeat test. Air in the hydraulic system can cause incorrect operation.

    If the unit still fails to operate properly, disassemble hydraulic mechanism as described on page 4. Check carefully for sludge accumulation, dirt, or scratches on any of the parts. Wash hydraulic parts in a clean degreasing fluid and carefully resasemble. Cleanliness is important! Repeat test.

DISASSEMBLY INSTRUCTIONS

Observe the following procedure if components must be removed for any reason. Best results will be obtained if the order described is followed.

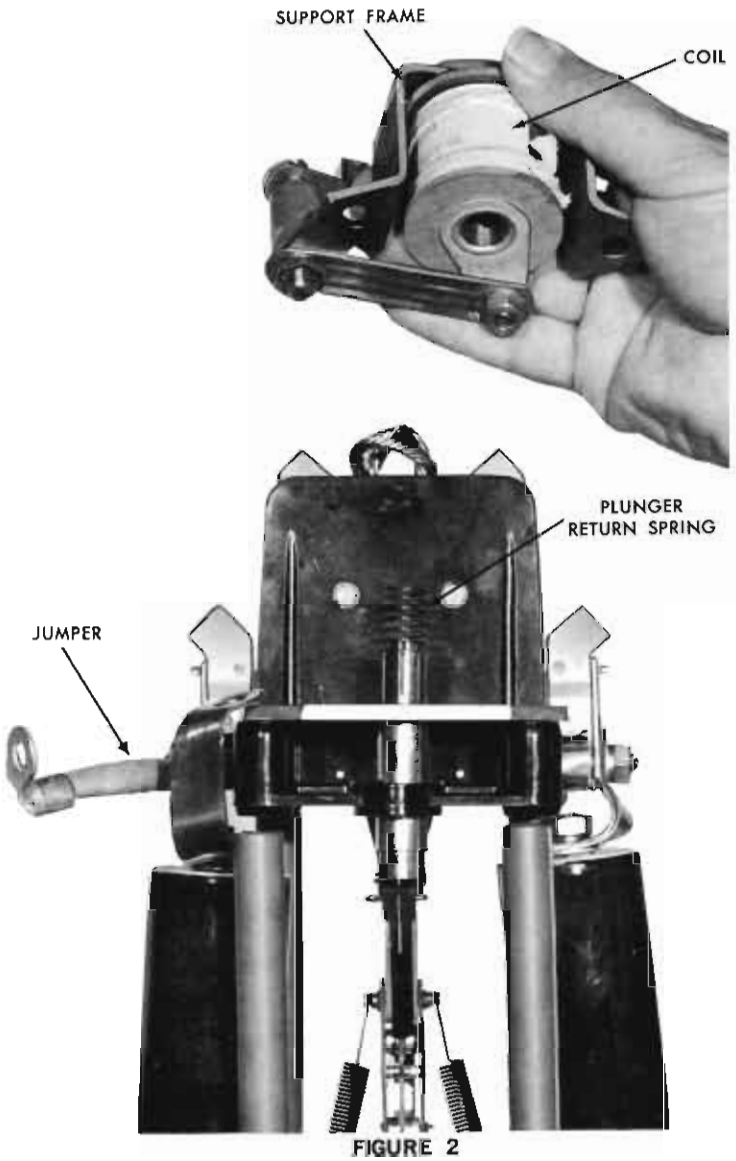


FIGURE 2
LIFTING OFF COIL SUPPORT FRAME AND COIL.

HYDRAULIC MECHANISM

1. Disconnect the jumper from the coil gap by removing the palnut that secures it.

   For the old style coil gap it is necessary to remove the brass bolts that secure both coil ends, and to remove the coil gap. Note that a hard paper coil shield will also be released.

2. Grasp insulating stringers with pliers, and loosen cap screws that secure the coil frame. Be sure to use sturdy cardboard or similar material to prevent pliers from marring stringers. (This procedure is necessary to prevent breakage of molded lugs on the insulated contact box.)
3. Lift off support frame and coil as shown in figure 2. Note the position of the solenoid gasket on the support frame when the coil is separated from the frame.
4. Next, lift off (in order) plunger spring, plunger, and cylinder assembly. The trip piston will fall free as the cylinder assembly is raised.
5. If further maintenance is to be performed, do not reassemble hydraulic mechanism. When reassembly is to be performed, simply reverse the foregoing procedure.

NOTES:

a. Support frame, solenoid plunger, and cylinder assembly are sold only in matched sets. Replace all three parts if any one is to be replaced.

b. Coils rated 50 amperes and lower differ slightly from those rated 70 amperes and higher.

c. Use new solenoid gaskets furnished with new coils. Install new data plate supplied with coils.

d. Wash all hydraulic parts in clean degreasing fluid before reassembling. Use extreme care to keep parts clean and free of nicks or scratches.

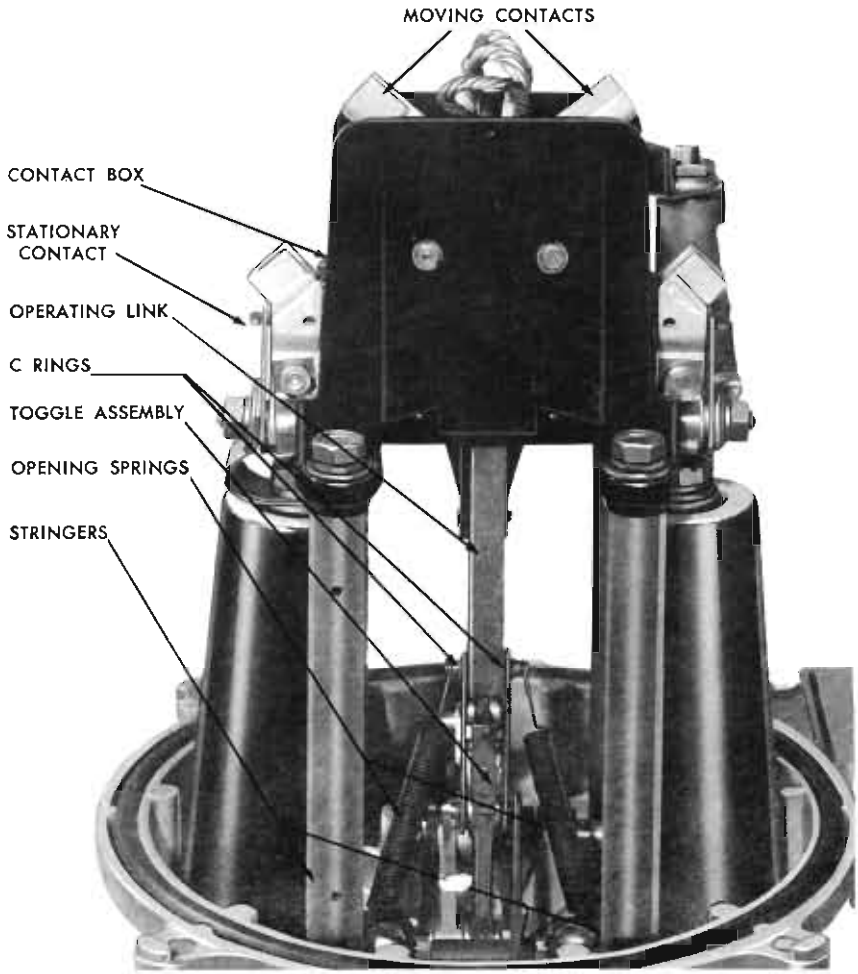


FIGURE 3
VIEW OF CONTACT STRUCTURE.

CONTACT STRUCTURE

1. Unhook opening springs shown in figure 3. Remove the C ring and pull the pin that connects the moving contact operating link to the toggle assembly.
2. Remove two cap screws that secure the contact box to the insulating stringers. Again, use pliers to hold the stringers. Lift off the entire contact structure.
3. If necessary take off stationary contacts by removing attaching hardware.
4. To simplify installation and to enable replacement at a lower cost, while still providing effective operation, the retaining and spacing arrangement of the moving contact assembly in the Type GH sectionalizer has been changed since serial no. 16500.

CONTACT STRUCTURE (cont'd)

Figure 4 illustrates the former parts used to retain the moving contact assembly in the Type GH contact structure. When replacing any of these parts, substitute the new parts with the assembly method in Figure 5.

5. Reassemble stationary contacts. Install studs only finger-tight so stationary contacts can move slightly to align with moving contacts. If the lockout adjustment bar was removed, be sure the end having a small indent is positioned toward the hydraulic pump piston.

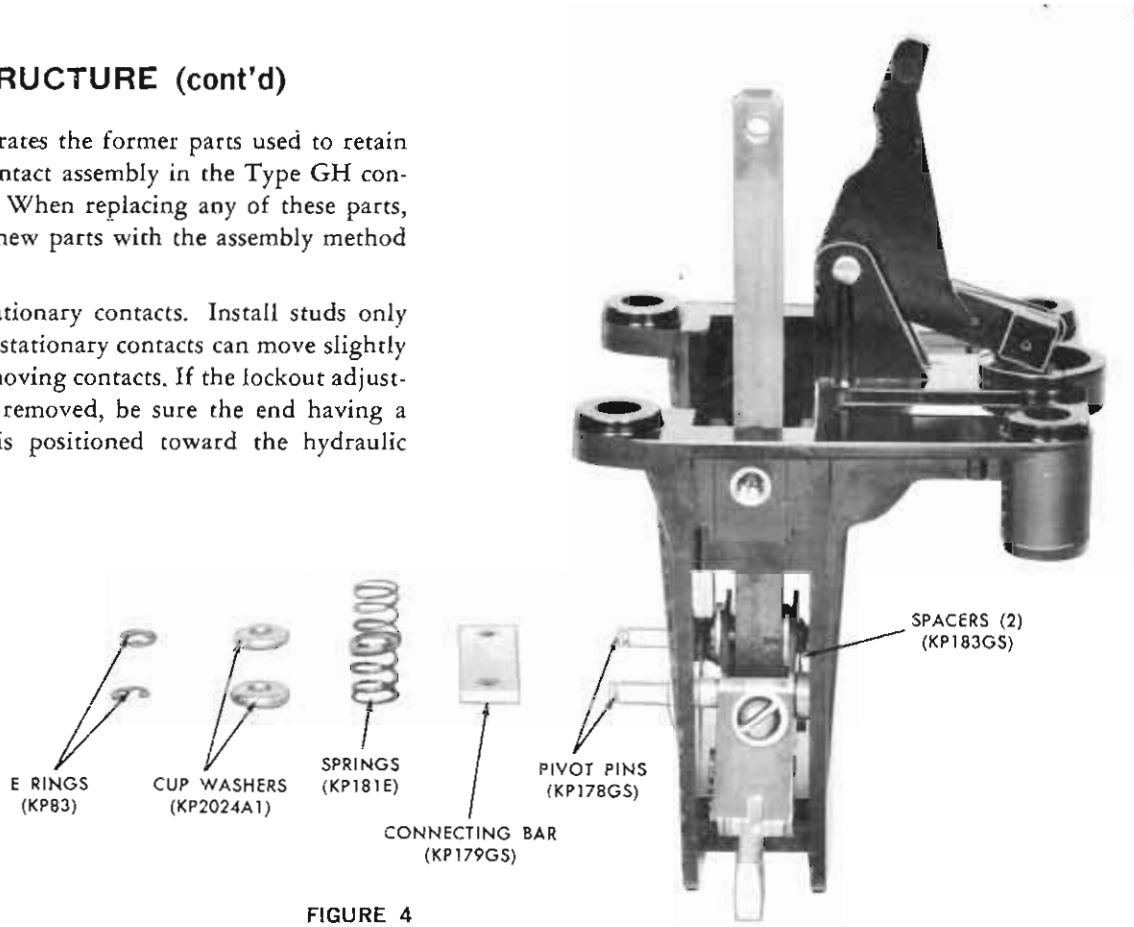


FIGURE 4
MOVING CONTACT RETAINING PARTS PRIOR TO SERIAL NO. 16500.

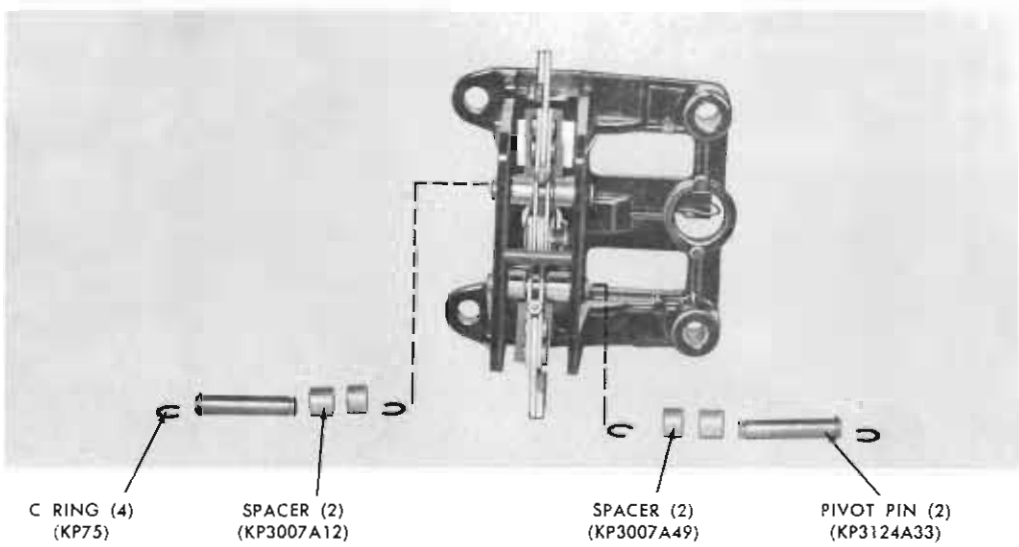


FIGURE 5
BOTTOM VIEW SHOWING NEW SPACER AND RETAINING ARRANGEMENT.

ADJUSTMENTS

1. NUMBER OF OPERATIONS TO LOCKOUT

An adjusting bar, secured to the contact mechanism box by a small cotter pin, has three holes marked to correspond to one, two, or three operations to lockout. To change this setting, merely remove the cotter pin, re-index the bar, and replace the cotter pin. See figure 1, page 2.

2. SHOCK—ABSORBING SPRING

This spring should be adjusted to clear the trip lever by 1/32 to 1/16 of an inch on the underside. See figure 6.

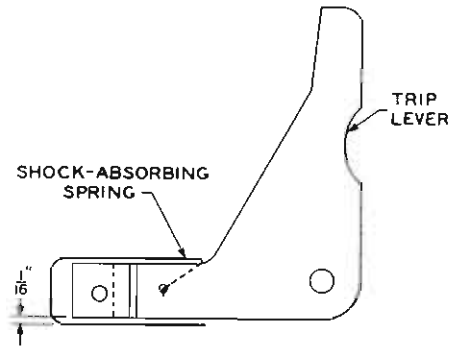


FIGURE 6
SHOCK-ABSORBING SPRING ADJUSTMENT.

BUSHING REPLACEMENT

1. Disconnect bushing leads at the coil terminal and the contact structure if not done previously.
2. Remove cap screws that secure the bushing clamps and lifting strap. Twist the aluminum clamping ring to remove it from the porcelain. Lift the entire bushing out.
3. If a new bushing assembly is to be installed, merely reverse the procedure outlined in steps 1 and 2. If new porcelain only is to be used, observe the following steps prior to replacement of bushing assembly:
   a. Remove bushing terminal and let oil drain.
   b. Withdraw bushing rod through the lower end of the porcelain.
   c. Remove lower lead and terminal assembly from the rod and then remove lower terminal gasket and oil seal.
   d. Install new lower terminal gasket and seal. Re-assemble terminal and rod. Insert rod in new porcelain.
   e. Fill porcelain with new, dry, transformer oil and let stand one hour. Refill to top. Add new upper terminal gasket and terminal.
   f. Place new bushing gasket on head casting and install bushing assembly.
4. If external spark gaps are used, be sure gap tips point directly toward holes in the gap post. Moreover, if tips or the gap post have been burned back they should be replaced.
5. Check to see that bushing on the sleet-hood side clears manual operating lever shaft. Clearance can be provided by shifting bushing slightly.

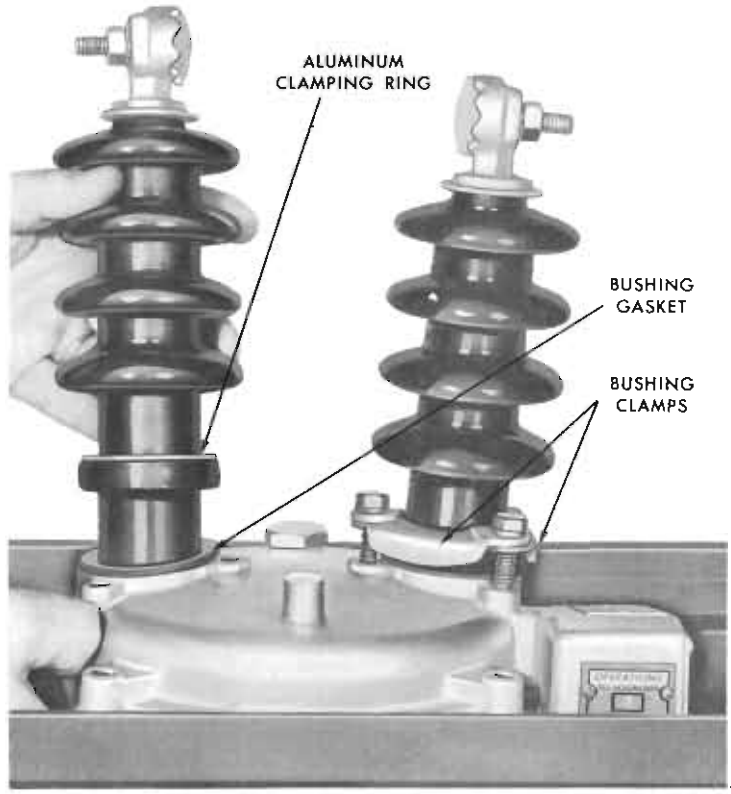


FIGURE 7
BUSHING REMOVAL.

HEAD MECHANISM

DISASSEMBLY INSTRUCTIONS

1. Refer to figure 8 which shows a head mechanism after hydraulic components, contact mechanism, and bushings have been removed. Lift out the two contact opening springs.
2. Remove screws holding latch brackets. Remove brackets, and then lift out latch and pin.
3. Unhook operating lever spring and the bell crank spring. Remove sleet hood cover.

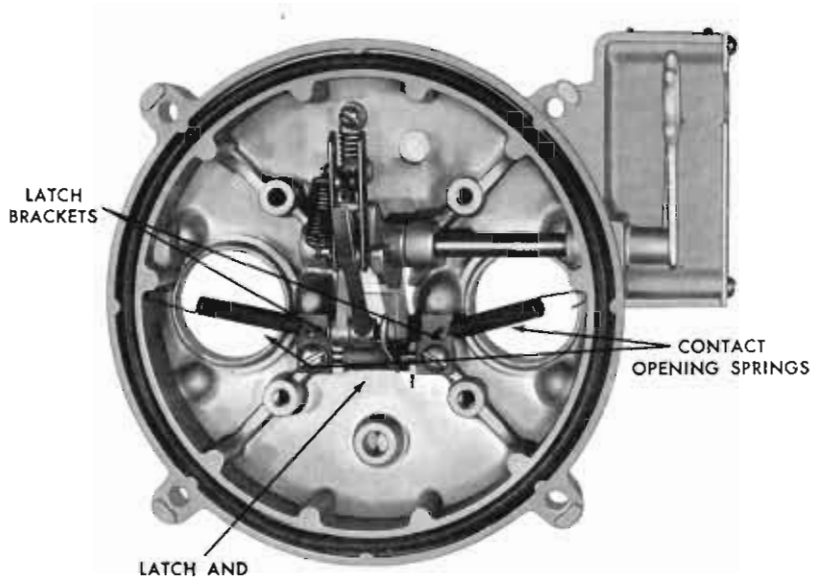


FIGURE 8
VIEW OF HEAD MECHANISM.

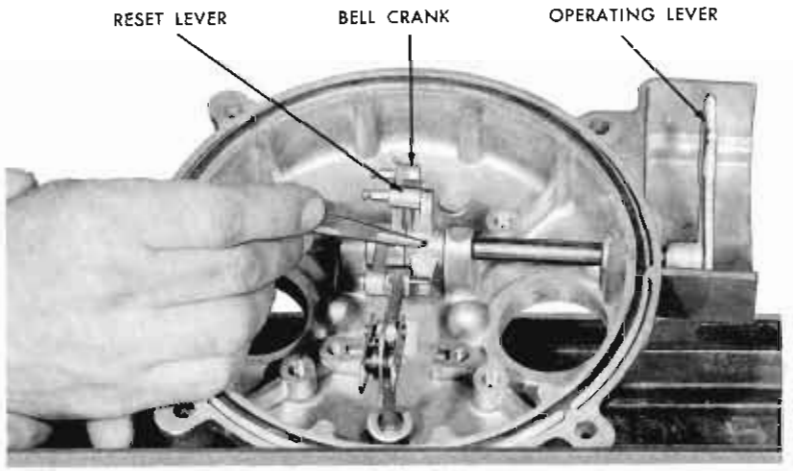


FIGURE 9
DRIVING OUT ROLL PIN.

4. Drive out roll pin, pointed out in figure 9, to release operating lever.

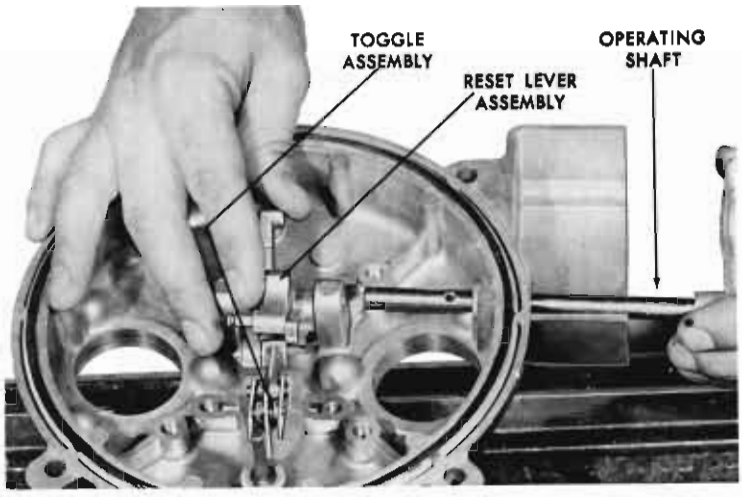


FIGURE 10
REMOVING LEVERS.

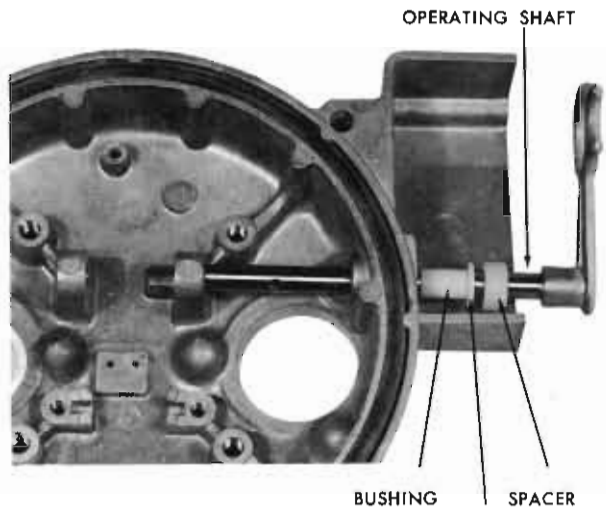


FIGURE 11
INSTALLING OPERATING SHAFT BUSHING AND SPACER.

5. Pull and twist operating shaft, figure 10, to remove it. Toggle assembly, and reset lever assembly will both be released.

6. Earlier type GH sectionalizers had a rubber seal at the head and operating shaft. Whenever this shaft is removed, this seal should be replaced with a delrin bushing and spacer as illustrated in Figure 11. The spacer is used only for those heads with a rubber seal. Present head castings are not counter-bored and will require only a bushing replacement, if necessary.

7. Re-assemble the rest of the head components including toggle assembly and reset lever as shown in figure 10.

NOTE 1: Installation of the latch and pin will be simplified if the spring is not initially hooked to the latch. When the brackets that hold the lever pin have been secured, the spring can be pulled back and hooked to the latch.

NOTE 2: Latch brackets on early GH sectionalizers were installed as shown in figure 12. Best results will be obtained if the bracket away from the sleet hood is turned to the same position as the bracket closest to the sleet hood, as in figure 8.

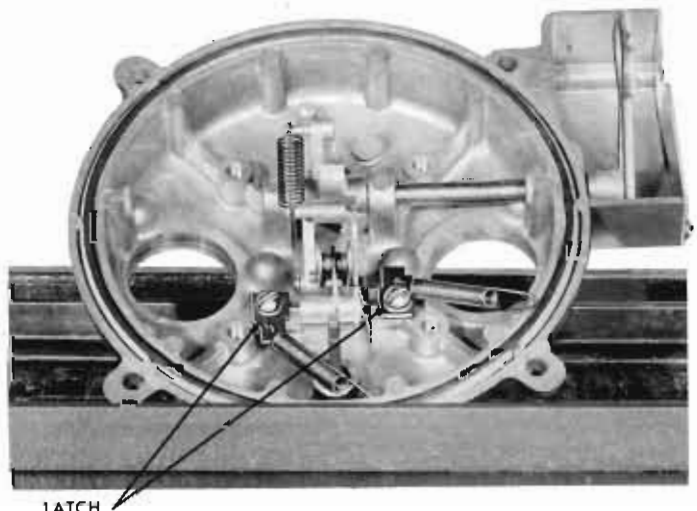
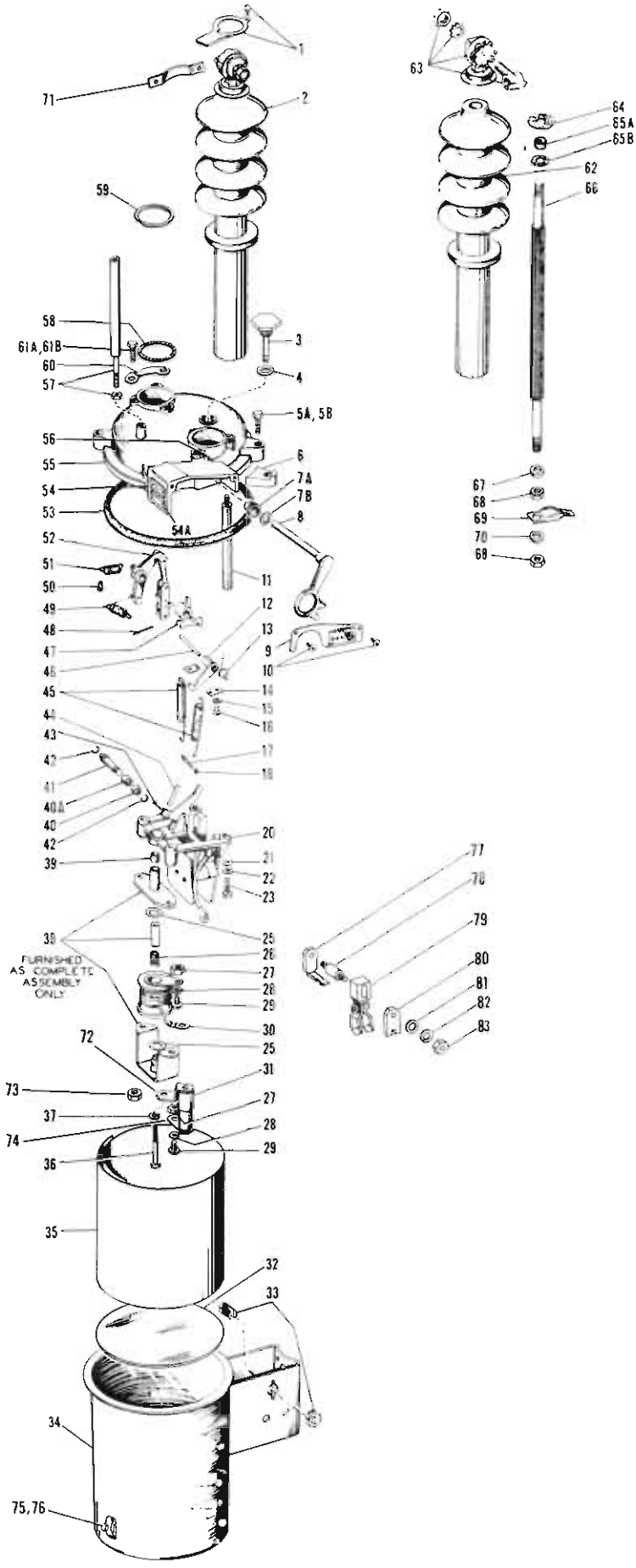


FIGURE 12
VIEW OF HEAD MECHANISM.
(See Note 2)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PARTS LIST

Item No.	Description	Catalog Number	Qty Reqd
1	Gap tip assembly with screw, below serial no. 12415	KA46GH	2
2	Bushing assembly, standard	KA346NR3	2
	Bushing assembly, 15-inch creepage	KA346NR4	2
	Bushing assembly, 17-inch creepage	KA346NR5	2
3	Oil dipstick (when used)	KA39NR	1
4	Dipstick gasket	KP2000A9	1
5A	Capscrew, 5/16—18x1-3/8, stl	KP1279	4
5B	Lockwasher, med, 5/16, stl	KP1109	4
6	Head clamp, above serial no. 16791	KP276NR	4
	Head clamp, below serial no. 16792	KP84NR	4
7A	Shaft insert	KP303641	1
7B	Oil seal	KP216GH	1
8	Operating handle assembly	KA52GH	1
9	Nameplate	KP185GH	1
10	Self-tapping screw, Type Z, no. 10x3/8, sst	KP52	2
11	Spacer assembly	KA6GH	4
12	Latch lever assembly	KA78GH	1
13	Latch lever spring	KP11GH1	1
14	Latch bracket	KP13GH	2
16	Machine screw, 1/4—20x3/8, stl with preassembled lockwasher	KP102	2
17	Spring pivot pin	KP49GH	1
18	Retaining ring, Type C, WA510	KP72	2
20	Contact box assembly	KA144GH1	1
21	Flat washer, SAE, 5/16"	KP350	4
23	Capscrew, 5/16—18x1, stl, with preassembled lockwasher	KP2	4
25	Solenoid gasket	KP2090A51	2
26	Return spring	KP84GH	1
27	Hex nut, 1/4—20, brass	KP274	2
28	Lockwasher, med, 1/4", bronze	KP347	2
29	Machine screw, 1/4—20x1/2, brass	KP473	2
30	Solenoid coil assembly, 5, 10, 15, 25, 35, 50 amp; state coil size as suffix: KA106GH25	KA106GH	1
	Solenoid coil assembly 70, 100, 140 amp; state coil size as suffix: KA793GH100	KA793GH	1
31	Coil gap assembly	KA100GH	1
32	Tank bottom liner	KP114NR	1
33	Grounding lug, (early GH)	J-2A	1
34	Tank assembly	KA21NR	1
35	Tank wall liner	KP115NR	1
36	Capscrew 5/16—18x2, stl	KP183	2
37	Lockwasher, med, 5/16", stl	KP1109	2
38	Coil support assembly	KA44GH	1
39	Trip piston	KP79GH	1
40A	Spacer, narrow	KP3007A49	2
40B	Spacer, wide	KP3007A12	2
41	Pivot pin, moving contact	KP3124A33	2
42	Retaining ring, Type C, WA514	KP75	4
43	Cotter pin, 1/16x1/2, stl	KP301	1
44	Lockout adjustment bar	KP86GH	1
45	Contact opening spring	KP40GH	2
46	Latch lever pin	KP3054A2	1
47	Reset lever assembly	KA9GH1	1
48	Roll pin, 1/8x15/16, stl	KP501	1
49	Operating handle spring	KP16GH	1
50	Self-tapping screw, Type Z, no. 10x3/8	KP52	1
51	Bell crank spring	KP162GH	1
52	Toggle assembly	KA95GH	1
53	Tank gasket	KP2013A12	1
54A	Coil data plate	KP190GH	1
54B	Lockout data plate	KP207GH	1
55	Head casting	KP215GH2	1
56	Self-tapping screw, Type Z, no. 2x3/16, stl	KP69	4
57	Rod, gap assembly, including nut, below serial no. 12415	KA53GH	1
58	Lower bushing gasket	KP2090A40	2
59	Clamping ring	KP110NR	2
60	Bushing clamp	KP83NR	6
61	Capscrew, 5/16—18x1-38, stl	KP1279	6
61A	Lockwasher, med, 5/16, stl	KP1109	6
62	Bushing porcelain only, standard	KP109NR	2
	Bushing porcelain only, 15-inch creepage	KP156GH	2
	Bushing porcelain only, 17-inch creepage	KP189GH	2
63	Bushing terminal assembly	KA45NR	2
64	Upper bushing gasket	KP2090A50	2
65A	Oil seal	KP118GH2	2
65B	Gasket	KP2090A43	2
66	Rod, standard bushing	KA347NR3	2
	Rod, 15-inch creepage bushing	KA347NR4	2
	Rod, 17-inch creepage bushing	KA347NR5	2
67	Spacer	KP3013A15	2
68	Hex nut, 5/16—18, brass	KP283	4
69	Lead	KP3251A2	2
70	Flat washer, 5/16, stl	KP1105	2
71	Lifting strap	KP421H	1
72	By-pass lead	KP222GH	1
73	Palnut, standard	KP2064A3	2
74	By-pass lead	KP3251A4	1
75	Ground connector	KA226H	1
76	Capscrew 1/2—13x1, stl	KP1282	1
77	Contact bracket	KP172GH	2
78	Contact post	KP170GH	2
79	Stationary contact assembly	KA84GH	2
80	Contact retainer	KP171GH	2
81	Flat washer, 1/4", stl	KP1110	2
82	Lockwasher, med, 1/4", bronze	KP347	2
83	Hex nut, 1/4—20, brass	KP274	2

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